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(12) **United States Patent**
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(54) **VIDEO-ON-DEMAND SYSTEM**

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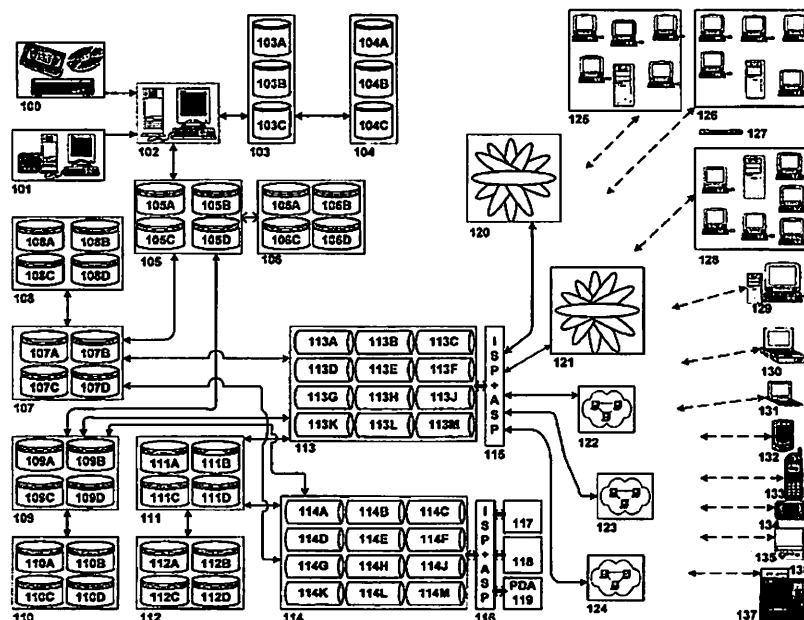
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(57) **ABSTRACT**

A video-on-demand system provides efficient commercial distribution for renting and/or selling movies, video programs, video games and electronic data. Data input stations upload original video data from videotapes, videocassettes, videodisks or film, or from electronic data format on transferable storage media or over a telecommunications line. A video data capture computer converts the original video data into a preferred video data storage format and stores the video data files in a first generation video data storage unit. The video data files are sorted by categories and classified in indexed master files stored on a second generation video data storage unit. NTSC, PAL and/or HDTV versions of the video data files are created and stored in separate data storage units for serving different markets. Customers access the system through computer servers connected to the Internet. The computer servers access the video data file in the data storage units and create a temporary video data file, which is downloaded to the customer via the Internet. The video data file is downloaded at high speed and stored on the customer's video player device for viewing at a later time. The video data files can be downloaded, stored and viewed on a desktop computer, a laptop computer, palmtop computer, a set-top data storage device connected to a television set, video game device, or a personal digital assistant, cellular telephone or pager with video capabilities. The system includes back-up mirror storage files at all levels of the system for security against data loss.

12 Claims, 1 Drawing Sheet



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In operation, a customer initiates a transaction by contacting the video-on-demand system through one of the various means described above. In one particularly preferred method, the customer contacts the remotely accessible computer servers 113, 114 of the system through the ISP/ASP interfaces 115, 116 via a website accessible on the Internet or the World Wide Web. The website presents the customer with a graphical user interface (GUI) for selecting, ordering and downloading various video materials. The website can be contacted using any device that is Internet Protocol enabled. In an alternate method, the customer can contact the system using a voice activated user interface over a telephone or cellular telephone network using voice commands to select and order video materials. For computers or telecommunications devices with both capabilities, a combined graphical and voice activated user interface provides additional flexibility and convenience to the customer.

If this is a customer's first transaction on the video-on-demand system, the website or other user interface will take the customer through a registration procedure. New customers will be asked for identification and billing information and will be queried about the preferred viewing format and download pathway for video materials, depending on their hardware and software configuration. A unique account number and a password will be assigned to or selected by the customer. If desired, the account number may include significant identifying information, such as a unique geographical identifier. In an exemplary embodiment, a unique account number may be created using the customer's telephone number, a geographical code, which may be a postal code, such as an extended zip code, or the three digit identification code for the nearest airport, and three trailing digits.

Return customers can sign in and enter the website or user interface without registration by giving their account number and password or other identifying information. The sign-in step can be handled automatically by the customer's computer or other connecting device if it is programmed to do so. After signing in, return customers can update identification, billing, viewing format and download pathway information at any time. Once connected to the website or user interface, the customer can browse, search and select one or more movies or other video programs to rent or purchase. Descriptions, reviews, advertisements, clips and trailers of the video materials may be provided to help customers make their selections. Customers can create search agents to help them identify and select movies and video programs that meet certain desired characteristics and/or based on previous selections and the customer's evaluation of them.

The customer selects whether he or she wishes to purchase or rent the video selections and, if appropriate, specifies a time period for the rental. The computer server 113, 114 completes the billing and accounting portion of the transaction and stores the account information in the accounting and billing record database on data storage unit 111. Preferably, billing and payment for the transaction are handled electronically over the Internet using a secure Internet payment protocol.

The selected video data files may be downloaded to the customer immediately or at a later specified time. At the specified time, the computer server 113, 114 through which the request was received accesses the video data file in the appropriate data storage unit 105, 107, 109 and creates a temporary video data file 113A, 113B . . . 113M, 114A, 114B . . . 114M by transferring the video data over a high speed data link to the computer server 113, 114 appropriate

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for the selected download method. The transfer of video data files over the high speed data link is continuously monitored by error detection and correction software. The video data file is then downloaded to the customer via the appropriate ISP/ASP interface 115, 116. The video data file is downloaded at high speed and stored on the customer's video player device for viewing at a time of the customer's own choosing. The video player device allows the viewer to stop, pause, replay, slow motion replay and fast forward the video program at any time while viewing. The downloading of video data files to the customer is continuously monitored by error detection and correction software.

As mentioned above, the connection between the customer and the video-on-demand system can be asymmetrical. If the customer contacts the system to place an order through a different device than the device used for storing and viewing the video data files, the order processing and the video data file downloading may be handled on different computer servers 113, 114 and/or over different ISP/ASP interfaces 115, 116.

Purchased and/or rented video data files will preferably be downloaded in a copy protected format to prevent unauthorized reproduction or resale of the video data files by the customer. In addition, rented video data files will preferably be downloaded in a time sensitive format that will delete the file or make it inaccessible or unviewable after the expiration of the specified rental period. Alternatively or in addition, rented video data files may be downloaded in a format that limits the number of viewings, after which the files would be deleted or made inaccessible or unviewable. This eliminates the need for returning rented video materials and the inconvenience and potential expense associated with it. If desired, the customer may increase or renew the rental period and/or upgrade a rental to a purchase for an additional fee. This feature may be implemented in such a way that a repeat download of the video data files will be unnecessary, for example by supplying the customer with an authorization number to renew or upgrade the transaction. The system may also be configured to allow prior purchasers of a video data file to download the file again in the event of damage, loss of data corruption of the original video data file.

While the present invention has been described herein with respect to the exemplary embodiments and the best mode for practicing the invention, it will be apparent to one of ordinary skill in the art that many modifications, improvements and subcombinations of the various embodiments, adaptations and variations can be made to the invention without departing from the spirit and scope thereof.

What is claimed is:

1. A multitiered video-on-demand system configured for high speed downloading of video data files with fault tolerance and resistance to data corruption, comprising:
 - a first system tier including:
 - a first generation video data storage unit for storing original video data files;
 - wherein the first system tier is configured to not be remotely accessible by customers of the video-on-demand system;
 - a second system tier including:
 - a second generation video data storage unit for storing second generation video data files sorted by category and classified in indexed master files;
 - a high speed data link between the first generation video data storage unit and the second generation video data storage unit, the high speed data link being configured to allow high speed downloading of video data files from the first generation video data storage unit to the

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second generation video data storage unit and to prevent uploading of data from the second generation video data storage unit to the first generation video data storage unit, thus resisting data corruption of the original video data files on the first generation video data storage unit;

an error detection system for monitoring the downloading of second generation video data files from the first generation video data storage unit to the second generation video data storage unit and for errors in the second generation video data files, the error detection system being configured to stop the downloading of a second generation video data file if an error is detected and to start the downloading over from the last point where the second generation video data file was known to be not corrupted, the error detection system being further configured to selectively initiate the video-on-demand system to restore the second generation video data file on the second generation video data storage unit from the original video data files on the first generation video data storage unit if repeated errors are detected in the downloading of the second generation video data file;

wherein the second system tier is configured to not be remotely accessible by customers of the video-on-demand system;

a third system tier including:

a remotely accessible computer server configured for accessing the video data files, creating temporary video data files and downloading the temporary video data files for storage and viewing on a customer's video playing device;

a high speed data link between the second generation video data storage unit and the remotely accessible computer server, the high speed data link being configured to allow high speed downloading of video data files from the second generation video data storage unit to the remotely accessible computer server and to prevent uploading of data from the remotely accessible computer server to the second generation video data storage unit, thus resisting data corruption of the second generation video data files on the second generation video data storage unit; and

an error detection system for monitoring the downloading of temporary video data files from the remotely accessible computer server and for detecting errors in the temporary video data files, the error detection system being configured to stop the downloading of a temporary video data file if an error is detected and to start the downloading over from the last point where the temporary video data file was known to be not corrupted, the error detection system being further configured to initiate the video-on-demand system to restore the temporary video data file on the remotely accessible computer server from the second generation video data files on the second generation video data storage unit if repeated errors are detected in the downloading of the temporary video data file;

wherein only the third system tier is configured to be remotely accessible by customers of the video-on-demand system.

2. The video-on-demand system of claim 1, further comprising:

a back-up first generation video data storage unit for storing back-up original video data files.

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3. The video-on-demand system of claim 1, further comprising:

a back-up second generation video data storage unit for storing back-up video data files.

4. The video-on-demand system of claim 1, further comprising:

at least one video data storage unit for storing versions of the video data files in a specified video display format.

5. The video-on-demand system of claim 4, further comprising:

a back-up video data storage unit for storing back-up copies of the versions of the video data files in the specified video display format.

6. The video-on-demand system of claim 4, further comprising:

a second video data storage unit for storing a second version of the video data files in a second specified video display format.

7. The video-on-demand system of claim 1, wherein the remotely accessible computer server is configured for downloading the temporary video data files to the customer's video playing device via an Internet Service Provider.

8. The video-on-demand system of claim 1, wherein the remotely accessible computer server is configured for downloading the temporary video data files to the customer's video playing device via a wireless Internet Service Provider.

9. The video-on-demand system of claim 1, wherein the remotely accessible computer server is configured for downloading the temporary video data files to the customer's video playing device in a compressed data format.

10. The video-on-demand system of claim 1, further comprising:

a first data input station configured for uploading original video data of movies or other video programs from their original storage medium to a video data capture computer.

11. The video-on-demand system of claim 10, further comprising:

a second data input station configured for uploading original video data of movies or other video programs from electronic data format to the video data capture computer.

12. A multitiered video-on-demand system configured for high speed downloading of video data files with fault tolerance and resistance to data corruption, comprising:

a first system tier including:

a first data input station configured for uploading original video data of movies or other video programs from their original storage medium;

a second data input station configured for uploading original video data of movies or other video programs from electronic data format;

a video data capture computer for converting the original video data to original video data files of a selected data storage format;

a first generation video data storage unit for storing the original video data files;

a back-up first generation video data storage unit for storing back-up original video data files;

a high speed data link between the first generation video data storage unit and the back-up first generation video data storage unit configured to allow high speed transfer of video data files from the first generation video data storage unit to the back-up first generation video data storage unit and to allow high speed transfer of video data files from the back-up first generation video

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data storage unit to the first generation video data storage unit to refresh or restore the original video data files if data corruption is detected;

wherein the first system tier is configured to not be remotely accessible by customers of the video-on-demand system;

a second system tier including:

a second generation video data storage unit for storing second generation video data files sorted by category and classified in indexed master files;

a high speed data link between the first generation video data storage unit and the second generation video data storage unit, the high speed data link being configured to allow high speed downloading of video data files from the first generation video data storage unit to the second generation video data storage unit and to prevent uploading of data from the second generation video data storage unit to the first generation video data storage unit, thus resisting data corruption of the original video data files on the first generation video data storage unit;

a back-up second generation video data storage unit for storing back-up second generation video data files sorted by category and classified in indexed master files;

a high speed data link between the second generation video data storage unit and the back-up second generation video data storage unit configured to allow high speed transfer of video data files from the second generation video data storage unit to the back-up second generation video data storage unit and to allow high speed transfer of video data files from the back-up second generation video data storage unit to the second generation video data storage unit to refresh or restore the second generation video data files if data corruption is detected;

an error detection system for monitoring the downloading of second generation video data files from the first generation video data storage unit to the second generation video data storage unit and for second generation errors in the temporary video data files, the error detection system being configured to stop the downloading of a second generation video data file if an error is detected and to start the downloading over from the last point where the second generation video data file was known to be not corrupted, the error detection system being further configured to selectively initiate the video-on-demand system to restore the second generation video data file on the second generation video data storage unit from the first generation video data files on the first generation video data storage unit or from the back-up second generation video data files on the back-up second generation video data storage unit if repeated errors are detected in the downloading of the second generation video data file;

a first video data storage unit for storing a first version of the video data files in a first specified video display format;

a back-up first video data storage unit for storing back-up copies of the versions of the video data files in the first specified video display format;

a second video data storage unit for storing a second version of the video data files in a second specified video display format;

a back-up second video data storage unit for storing back-up copies of the versions of the video data files in the second specified video display format;

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wherein the second system tier is configured to not be remotely accessible by customers of the video-on-demand system;

a third system tier including:

a first remotely accessible computer server configured for accessing the video data files in the second generation video data storage unit, the first video data storage unit and/or the second video data storage unit, creating temporary video data files and downloading the temporary video data files via an Internet Service Provider for storage and viewing on a customer's video playing device;

a high speed data link between the second generation video data storage unit and the first remotely accessible computer server, the high speed data link being configured to allow high speed downloading of video data files from the second generation video data storage unit to the first remotely accessible computer server and to prevent uploading of data from the first remotely accessible computer server to the second generation video data storage unit, thus resisting data corruption of the second generation video data files on the second generation video data storage unit;

a second remotely accessible computer server configured for accessing the video data files in the second generation video data storage unit, the first video data storage unit and/or the second video data storage unit, creating temporary video data files and downloading the temporary video data files via a wireless Internet Service Provider for storage and viewing on a customer's video playing device;

a high speed data link between the second generation video data storage unit and the second remotely accessible computer server, the high speed data link being configured to allow high speed downloading of video data files from the second generation video data storage unit to the second remotely accessible computer server and to prevent uploading of data from the second remotely accessible computer server to the second generation video data storage unit, thus resisting data corruption of the second generation video data files on the second generation video data storage unit; and

an error detection system for monitoring the downloading of temporary video data files from the first and second remotely accessible computer servers and for detecting errors in the temporary video data files, the error detection system being configured to stop the downloading of a temporary video data file if an error is detected and to start the downloading over from the last point where the temporary video data file was known to be not corrupted, the error detection system being further configured to initiate the video-on-demand system to restore the temporary video data file on the first and/or second remotely accessible computer servers from the second generation video data files on the second generation video data storage unit if repeated errors are detected in the downloading of the temporary video data file;

wherein only the third system tier is configured to be remotely accessible by customers of the video-on-demand system.

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